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APR. 1964

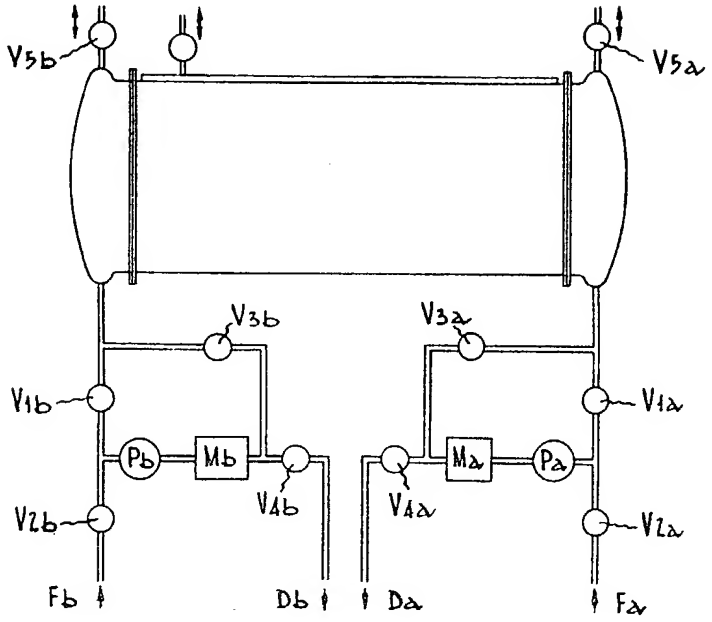


FIG. 4.

FIG. 5.

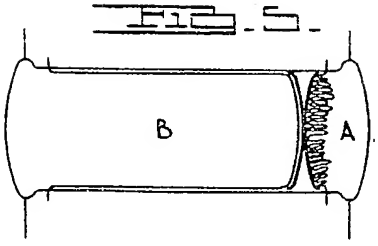
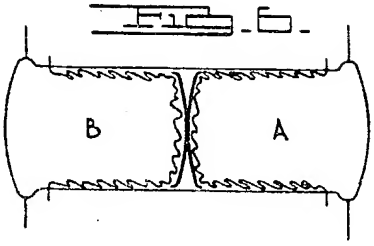


FIG. 6.



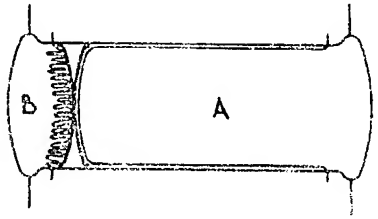


FIG. 7.

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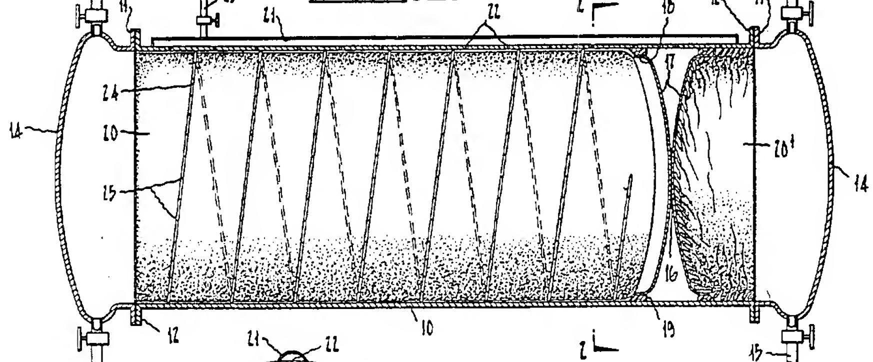

FIG. 1.

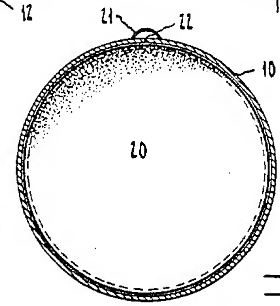

FIG. 2.

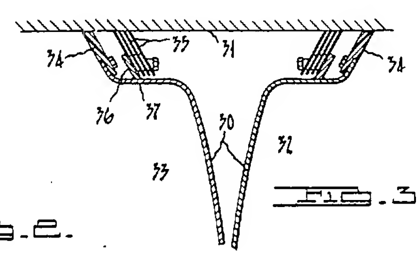

FIG. 3.

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COMMONWEALTH OF AUSTRALIA
PATENT SPECIFICATION 55,130/59

Complete Specification Lodged ..... 10th November, 1960.
Application Lodged(No. 55,130/59) ..... 27th November, 1959.

Applicant (Actual Inventor). ..... Frederick Bryant.

Complete Specification Published ..... 15th November, 1962.
Complete Specification Accepted ..... 3rd April, 1964.

Classification 57. 2; 96. 1; 93. 1.
International Classification B 65 d.
Drawings (2 sheets) attached.

COMPLETE SPECIFICATION.

BULK FLUID TRANSPORT.

The following statement is a full description of this invention, including the best method of performing it known to us:-

This invention relates to tanks for the transportation of flowable material and refers more particularly to a tank of the type adapted for transportation of two fluids which it is desired should not mix or come into contact.

Most bulk fluid transport tanks at present in operation provide for the transportation of only one fluid with the result that it is usual for the transport to make its return journey with an empty tank. The inability to transport different fluids in the one tank has resulted in high operation costs. Whilst several attempts have been made to overcome this disadvantage, as yet, none of these has proved to be entirely satisfactory and it is accordingly an object of the present invention to provide a bulk liquid transport which will enable the transportation of two fluids which, if desired, should not mix or come into contact. A further object of the invention is to provide such a transport which is simple in its construction and efficient in its operation.

A bulk fluid transport according to one broad form of the invention, comprises a bulk fluid transport tank comprising a main tank having a piston movable therein, filler and air release openings in the tank, said openings being so arranged that in all positions of the piston, there is a filler and air release opening in the tank at each side of said piston.

Preferably, a flexible bag is inserted in the tank on the forward side of the piston whilst another flexible bag is inserted in the tank at the rear side of the piston, the first mentioned bag communicating with filler and air release openings in the forward end of the

Referring to the embodiment illustrated in Fig. 3 one of the bags 20, 20^1 may be dispensed with and the piston 30 is modified so that a vapour and/or liquid tight seal may be obtained between said piston 30 and cylinder wall 31. A perfect seal is not required when two bags are used but must be provided when only one bag is used otherwise the free liquid would be permitted to leak from one side 32 of the piston 30 to the other side 33. In order to obtain this seal the piston 30 is of the same general construction as the piston 16, but may be fabricated to the appropriate tolerances and sealing pressures and provided with a tapered leading edge 34 so shaped as to peel the bag from the cylinder wall. To the rear of this edge 34 there is provided a plurality of sealing strips or blades 35 of "Teflon" or the like. The blades 35 are fixed to a support 36 welded or otherwise attached to the flanged circumferential edge 37 of the piston 30.

In describing a preferred method of filling and emptying the tank, reference will be made to Figs. 4 to 7 of the drawings. For the sa e of convenience, it will be assumed that the tank is to transport petroleum on its outward journey and milk on its return journey. Before commencing the filling of tank "A" it is necessary to make sure that the piston is at the "A" end of the tank. The filling hose is then coupled to the filler coupling FA and valves V1a and V4a are closed and valves V2a and V3a are opened. Vent valve V5a is opened and vent valve V5b is closed thereby allowing the escape of air from the tank "A" but not from tank "B". The meter Ma registers or measures the quantity delivered to tank "A", the maximum quantity being determined by the free space in tank "B" necessary to allow for expansion of the product in tank "A" and the pump Pa is started.

After the pump Pa has been operating for some time, the pressure due to the height of liquid now in tank "A" will cause the piston P to move towards end B of the tank and as the air entrapped in tank "B" cannot escape, pressure is built up therein. When the piston comes to rest the tank "A" will be full. Valve V5a is then closed and valve V5b is opened sufficiently so that the piston will move to allow for the volume delivered by the pump Pa. Valves V2a and V3a are closed and the filling hose disconnected.

In order to effect partial discharge of the product from tank "A" is should first be checked that valve V5b is open thus allowing the piston to follow the product as it is discharged. The meter Ma is used to measure the quantity delivered, the discharge hose is connected at Da and valves V1a and V4a are opened. The pump is then started. On completion of the partial discharge, these valves are closed.

For complete discharge and draining of tank "A", valve V5a is opened in addition to valve V5b, and the operation then proceeds as for partial discharge. For complete drainage, it is preferable for the bag in tank "A" (when a bag is used) to be completely elongated. To do this, valve V5b is closed and pump Pb is operated as a vacuum pump. The reduction in pressure in tank "B" will cause the piston to be returned to the end B of the tank. The tank may then be tilted to assist draining.

To fill tank "B" for the return journey, the piston is now at end B of the tank. If bag B is clean and ready to receive the second product which in this case is milk, then filling proceeds as for tank "A".

Throughout the filling, carrying and discharging operations, vacuum is applied to the tank through the vacuum manifold thereby causing the faces of the bags to be maintained against the cylinder wall and also having the advantage of immediate removal of any vapour which may permeate through a bag.

It will therefore be seen that by the present invention, there is provided a system which makes it possible for a tank transport to carry different liquid loads on both outward

strip comprises a plurality of blades or washers arranged in spaced parallel relation, said blades being formed from flexible material. (27th November, 1959).

8. A bulk fluid transport as claimed in any one of claims 2 to 7 wherein the bag or bags is/are of polyethylene, polytetrafluorethylene or the like. (27th November, 1959).

9. A bulk fluid transport as claimed in any one of claims 2 to 8 wherein the bag or bags is/are provided with plastic tubing or the like wound helically about the cylindrical surface of said bag or bags. (27th November, 1959).

10. A bulk fluid transport as claimed in any one of claims 2 to 9 characterized in that a vacuum manifold is arranged on the outer surface of the tank and communicates with the interior of said tank. (27th November, 1959).

11. A bulk fluid transport as claimed in claim 10 characterized in that the vacuum manifold is coupled to exhaust means whereby air may be withdrawn from between the bag and the tank wall thereby causing an empty bag to be held against the tank wall and/or effecting withdrawal from the tank of any vapour which may permeate the bag or bags. (27th November, 1959).

12. A bulk fluid transport comprising a main tank the end walls of which are removable upon release of retaining means, a filler opening in each end wall and an air release valve in the upper portion of each end wall, a piston slidable longitudinally within said tank, a pair of flexible bags arranged within the tank, one on each side of the piston, said bags each being open at one end and being attached about the periphery of their open ends to the end walls of the tank so as to communicate with the filler openings and air valves in said end walls, the arrangement of tank, bags and piston being such that the tank may be substantially filled with two incompatible products each of which is carried within its own bag either at the same time or separately without said products coming into contact with each other or with the same surfaces. (27th November, 1959).

13. A bulk fluid transport comprising a main tank, the end walls of which are removable upon release of retaining means, a filler opening in each end wall and an air release valve in the upper portion of each end wall, a piston slidable longitudinally within said tank and in substantially fluid-tight contact with the tank cylinder, a flexible bag arranged within the tank at one side of the piston, said bag being open at one end and being attached about the periphery of its open end to the end wall of the tank so as to communicate with the filler opening and air release valve therein, the bag being attached in such manner that fluid introduced into the tank through the filler opening associated with the bag is confined within said bag which when filled causes the piston to slide to the opposite end of the tank thereby enabling said filled bag to substantially completely occupy the tank. (27th November, 1959).

14. A bulk fluid transport as claimed in claim 12 or 13 wherein the filler openings are situated in the bottom of the end walls and also serve as drain openings for emptying the tank. (27th November, 1959).